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Atty. Dkt. No. SAR 14882

REMARKS

This is intended as a full and complete response to the Office Action dated November 9, 2004, having a shortened statutory period for response set to expire on February 9, 2005. Please reconsider the claims pending in the application for reasons discussed below.

Claims 1 - 26 remain pending in the application and are shown above. Claims 1-6; 10-12, 14-16, 19-22 and 24 stand rejected. Reconsideration of the rejected claims is requested for reasons presented below.

I. Claim Rejections under 35 U.S.C. § 102

Claim 1 stands rejected under 35 USC § 102 as anticipated by Uemura et al. (US. Patent 5,530,641, issued June 25, 1996) (Uemura). Applicants respectfully traverse the rejection.

Uemura discloses a vehicle provided with a radar unit for detecting an obstacle existing ahead in the course of the running way along which the vehicle is running. When the radar unit detects a variation in its detectable region, such as a detectable distance or a detectable area range in left and right directions from the detectable region to be detectable during ordinary running, a safety unit such as an alarm unit or an automatic brake unit is operated. (Uemura, Abstract)

The Examiner's attention is directed to the fact that Uemura fails to disclose "producing a depth map of a scene containing terrain from inputs received from a plurality of cameras". Applicants' independent claim 1 positively recites:

1. A method of detecting obstacles comprising:
producing a depth map of a scene containing terrain from inputs received from a plurality of cameras; and
processing the depth map to identify regions that do not exceed a mobility constraint for a vehicle, and regions that do exceed the mobility constraint of the vehicle. (emphasis added)

Applicants' invention discloses a method and apparatus for detecting obstacles. In one embodiment, the method uses a depth map in order to detect obstacles. In one embodiment, the method utilizes a depth map having a point cloud that represents the

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depth to the objects within the field of view of stereo cameras. The method labels areas that are difficult or impossible to traverse.

In contrast, Uemura utilizes a radar unit to detect an object in the path of a vehicle. When an object is detected by Uemura, a safety unit, such as an alarm unit or an automatic brake unit is operated. Uemura is completely devoid of the use of a depth map of a scene containing terrain from inputs received from a plurality of cameras. The Examiner cites FIG. 5 of Uemura as disclosing a depth map. The Applicants respectfully assert that the Examiner is incorrect. FIG. 5 of Uemura is clearly described as a map showing the process for computing a threshold value for avoiding a collision of the body of the vehicle with an obstacle. There is absolutely no teaching or disclosure of a depth map of a scene containing terrain from inputs received from a plurality of cameras. (See Uemura col. 6, line 66 – col. 7, line 33) Since there is no teaching of a depth map of a scene containing terrain from inputs received from a plurality of cameras in Uemura, Uemura also fails to disclose processing the depth map to identify regions that do not exceed a mobility constraint for a vehicle, and regions that do exceed the mobility constraint of the vehicle. Even if one could properly argue that a depth map is disclosed by Uemura, Uemura only detects an obstacle in a path of its vehicle within a detectable range of its radar system. Since Uemura teaches only the sensing of objects using radar, Uemura does not anticipate Applicants' claim.

II. Claim Rejections under 35 U.S.C. § 103

A. Claims 2-6

Claims 2-6 stand rejected under 35 USC § 103 in view of Uemura et al (US Patent 5,530,641 dated June 25, 1996) (Uemura) in view of Saban et al (US. Patent 5,448,233 issued September 5, 1995) (Saban). Applicants respectfully traverse the rejection.

Claims 2-6 depend either directly, or indirectly, from claim 1 and recite additional limitations. As argued above in Section I, Uemura fails to disclose a depth map of a scene containing terrain from inputs received from a plurality of cameras as recited in claim 1 since Uemura only discloses the use of a radar unit. This deficiency is not

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cured by Saban. Saban discloses an airborne obstacle collision avoidance apparatus which includes an object sensor for sensing objects within a field of view of the aircraft and an aircraft navigation system for navigating the aircraft through space. (See Saban Abstract) The Examiner concedes that Saban fails to disclose a depth map processor for processing the depth map to identify regions that do not exceed a mobility constraint for a vehicle, and regions that do exceed the mobility constraint of the vehicle. As such, Saban does not bridge the substantial gap left by Uemura as discussed above in view of Applicants' independent claim 1.

Since independent claim 1 is not made obvious by the combination of Uemura with Saban, dependent claims 2-6 are also not made obvious for the same reason noted above and fully satisfy the requirements of 35 U.S.C. § 103.

B. Claims 10-12, 14-16, 19-22, and 24

Claims 10-12, 14-16, 19-22 and 24 stand rejected under 35 USC § 103 in view of Saban et al (US. Patent 5,448,233 issued September 5, 1995) (Saban) in view of Uemura. Applicants respectfully traverse the rejection.

Saban discloses "an airborne obstacle collision avoidance apparatus which includes an object sensor for sensing objects within a field of view of the aircraft and an aircraft navigation system for navigating the aircraft through space. The apparatus also includes a signal processor for receiving data from both the object sensor and the aircraft navigation system, for generating map data of the objects within the field of view of the aircraft, for dynamically changing the map data as the aircraft moves through space and for determining the probability that the aircraft is on a collision course with respect to each sensed object. The apparatus further includes an alarm which is activated when the signal processor determines that there is a high probability that the current aircraft flight direction is on a collision course with respect to a sensed object." (See Saban Abstract)

The Examiner concedes that Saban fails to disclose "a depth map processor for processing the depth map to identify regions that do not exceed a mobility constraint for a vehicle, and regions that do exceed the mobility constraint of the vehicle", as

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positively claimed by the Applicants. Applicants' independent claims 10 and 19 positively recite:

10. Apparatus for detecting obstacles comprising:

a stereo image processor for producing stereo imagery of a scene containing terrain from inputs received from a plurality of cameras;

a depth map generator for processing the stereo imagery and producing a depth map; and

a depth map processor for processing the depth map to identify regions that do not exceed a mobility constraint for a vehicle, and regions that do exceed the mobility constraint of the vehicle. (emphasis added)

19. An obstacle detecting system comprising:

a vehicle having a movement system for moving the vehicle across a terrain;

a stereo image processor mounted to the vehicle, the stereo image processor for producing stereo imagery of a scene containing the terrain from inputs received from a plurality of cameras;

a depth map generator for processing the stereo imagery and producing a depth map; and

a depth map processor for processing the depth map to identify regions that do not exceed a mobility constraint for the vehicle, and regions that do exceed the mobility constraint of the vehicle. (emphasis added)

Applicants' invention discloses a method and apparatus for detecting obstacles. The method uses a depth map in order to detect obstacles. In one embodiment, the method utilizes a depth map having a point cloud that represents the depth to objects within the field of view of stereo cameras. In one embodiment, the method labels areas that are difficult or impossible to traverse.

As stated above, the Examiner concedes that Saban fails to disclose a depth map. Uemura is cited to cure the Examiner's perceived deficiency in Saban. As argued above in Section I, Uemura also fails to disclose a depth map since Uemura only discloses the use of a radar unit. Saban teaches an "object sensor means for sensing objects within a field of view of the aircraft". (Saban, col. 1, lines 28-29) Since Saban and Uemura fail to disclose the use of a depth map as claimed by Applicants and only

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teach the sensing of objects, the cited references do not render obvious Applicants' claims.

Applicants submit that Saban and Uemura either individually or in any reasonable combination do not render Applicants' independent claims 10 and 19 obvious. In addition, dependent claims 11, 12, 14-16, 20-22, and 24 are also non-obvious, at least for their dependency upon their respective base claim. As such, Applicants request reconsideration and withdrawal of the 35 U.S.C. §103 rejection.

II. Allowable Subject Matter

Applicants thank the Examiner for indicating allowable subject matter in claims 7-9, 13, 17, 18, 23, 25, and 26. Claims 7-9, 13, 17, 18, 23, 25, and 26 were objected to as being allowable but depending from a rejected base claim. Applicants thank the Examiner for indicating the conditional allowability of such subject matter, but have hereinabove provided arguments refuting the rejections of the independent claims. Thus, no changes to the dependent claims are made at this time.

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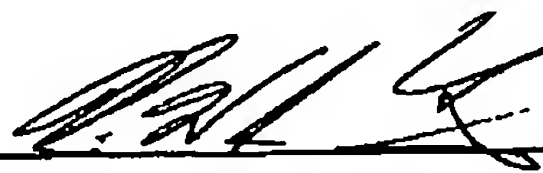
CONCLUSION

Thus, the Applicants submit that all of these claims now fully satisfy the requirements of 35 U.S.C. §102 and 35 U.S.C. §103. Consequently, the Applicants believe that all these claims are presently in condition for allowance. Accordingly, both reconsideration of this application and its swift passage to issue are earnestly solicited.

If, however, the Examiner believes that there are any unresolved issues requiring the issuance of a final action in any of the claims now pending in the application, it is requested that the Examiner telephone Mr. Kin-Wah Tong, Esq. at (732) 530-9404 so that appropriate arrangements can be made for resolving such issues as expeditiously as possible.

Respectfully submitted,

2/9/05
Date


Kin-Wah Tong, Attorney
Reg. No. 39,400
(732) 530-9404
Moser, Patterson & Sheridan, LLP
595 Shrewsbury Avenue
Shrewsbury, New Jersey 07702